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SALMON FEED EXPERIMENTS

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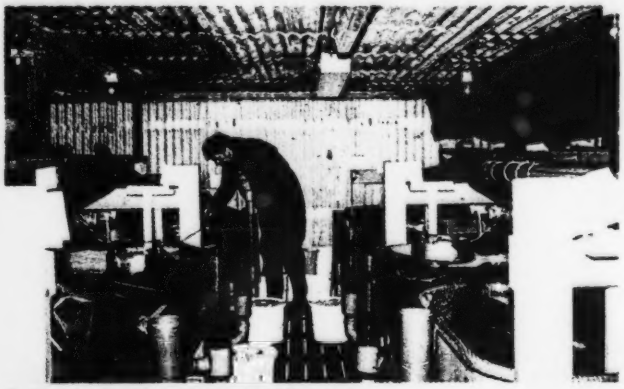

Soffia Vala hugar að tilraunafóðruninni.

Soffia Vala attending to the experimental feed

Research and development on Icelandic dry feed for salmonoids has been under way for the last two and a half years. The work has been done jointly by the Icelandic Fisheries Laboratories, the Agricultural Research Institute and the Reykjavik Dairy Association. The work is supported by the National Research Council.

The objective of the experiment is to develop salmon feed from Icelandic capelin produce and to establish, by means of chemical analysis and feeding experiments on young fish, the quality limits that need to be set on capelin meal and capelin oil, for them to be suitable for feed mixtures. Capelin meal and capelin oil are the main components of the fish feed used in the experiment, and as farmed fish are very sensitive to the quality of feed, options must be considered carefully.

The quality of the meal and the oil is to a large extent dependent on the quality of the capelin as raw material before processing, and the quality of oil can also deteriorate after processing. Chemical changes in the protein and fat are of importance.

About 70% of capelin meal is protein. When the capelin decomposes, protein molecules break partly down, due to enzymes and bacteria, into shorter protein compounds and also into single amino acids and fragments. With the heat associated with drying, amino acid units can then bind with other substances that are present in the meal (e.g. products of oxidized fat) and similarly change among themselves in the configuration or break down. These undesirable chemical changes cause the nutritional value of the meal to decrease, and many chemical compounds that are formed can also have a toxic effect on sensitive animals.

Spoiled capelin is often used in meal processing and the fat in it is then by and large rancid. Fish oils such as capelin oil contain a lot of polyunsaturated fatty acids which are particularly vulnerable to rancidification (oxidation). The fat begins to oxidize when the raw material is stored before processing and the oxidation continues during drying as well as during storage after the meal has been fully processed. Farmed fish are very sensitive to rancid fat in the feed; the smaller the young fish are, the more sensitive they are.

Capelin at various stages of spoilage were chosen for the experiment and the samples were analyzed with regard to substances such as TVN (total volatile nitrogen). Meal was then manufactured from the capelin in question, and the meal was analyzed with regard to substances such as free ammonia and biogenic amines. The fat in the meal was also analyzed to study the rancidity level (anisidine value, peroxide value and free fatty acids). The meal was then used in the experimental feed. Analyses of the raw material give clues as to its spoilage condition before processing and analyses of the meal underline further conditions of the raw material before processing and the heat treatment during drying.

Six feed mixtures were prepared and young salmon fed with the experimental feed as well as with one control feed which was approved, imported fish feed. The feed mixtures were varied as to the meal and oil only. The quality differences of the oil were classified on the basis of measurements of free fatty acids and the peroxide value. This applied to oil that was added in excess of the oil in the meal. The feed was prepared, i.e. mixed and ~~lumped~~ pelletized, in the feed plant of the Reykjavik Dairy Association.

The site of the feeding experiments was the National Salmon Farm in Kollafjordur. Fiberplastic containers of 1 m² were used. So-called disk feeders attached to a dial were used, so that a fixed daily dose of the feed was spread evenly in the containers over 24 hours. Disk feeders make a more or less identical feeding between containers possible. Each container had about 500 young fish and they were fed by twos, i.e., each feed mixture was used in the two containers. The young fish were weighed and their growth compared twice a month. The young fish were also observed as to health.

The conclusion of the first stage of the experiment is that feed mixtures which qualitywise seem to be competitive with foreign fish feed have been developed from Icelandic raw material for use as dry feed in salmon farming. Some clear quality standards for meal and oil have been established, but various aspects remain to be studied further.

One more feeding stage is going to start in May-June this year (1988), and it is to pay special attention to a chemical analysis of biogenic amines contained by meal going into the experimental feed as well as to observe what significance various drying processes have in this respect. The feeding experiment has offered some indications that the content of biogenic amines in capelin meal could be a suitable quality criterion for capelin meal to be used in fish feed manufacture.

The conclusions of this first stage of the work were set forth in an interim report published in March 1987 and entitled "Experiments on the Manufacture and Use of Fish Feed". The report contains 22 pages and is for the time being not in print. The authors are Soffia Vala Tryggvadottir, Jonas Bjarnason (Icelandic Fisheries Laboratories) and Olafur Gudmundsson (Agricultural Research Institute).